

These movements and these noises have often distracted me from my other observations, but without striking my mind, which was absorbed by the study of the ejection of water. I ascribed them, without accounting for them, either to the agitation of the atmosphere, to some of my own movements, to the hasty flight of some bird concealed in that impenetrable mass of foliage, or to an error of the eye produced by the fatigue which always follows too prolonged tension of the sight, &c. &c.

The observations of M. Lecoq are therefore to me a plain and genuine explanation of a very curious phenomenon which he has the merit of being the first to discover and to study with the sagacity which is habitual to him; my only aim is to confirm a new fact, and one which may appear extraordinary.

M. Lecoq says in his note that he had never been able to observe the fine drops that I have seen so often shoot from the vulvoid region situated underneath the apex. He himself gives the cause of it when he states that the membrane which covers that region is, in the leaves of his plant of *Colocasia*, imperforate. This imperforation (or, rather, this absence of large stomata, orifices of ejection) is extremely rare in the leaves of the species of *Colocasia* that I cultivate in the open ground; I have only detected it in the proportion approximately of 1 to 80. I am surprised that all the leaves observed by that learned naturalist should have presented this anomaly of the imperforation of the hymenoid membrane. Does this depend on the mode of culture, or on a difference of species? Eleven leaves of two plants of *Colocasia*, cultivated in a hot stove, have likewise never presented the least trace of gaping stomata. Be this as it may, M. Lecoq would perhaps see a certain relation of cause to effect between the spontaneous movements of the leaves and their imperforation. My own observations are not favourable to this hypothesis.

I take advantage of this opportunity to say that this year the leaves in vernalion have furnished me with still more remarkable results than those referred to in my memoir. My observations date from the 1st of May to the 15th of November. Now it is in the month of June, at the period when vegetation is in all its vigour, that the ejection of the water is also most vigorous. I have seen some convoluted leaves which, during cool evenings, emitted a continuous jet. Careful watchings certainly betrayed a slight intermittence; but it was absolutely impossible to count the drops, the number of which constantly exceeded 200 per minute.—*Comptes Rendus*, May 13, 1867, pp. 979–980.

On two new forms of Plants parasitic on Man (*Aspergillus flavescens* and *A. nigricans*). By ROBERT WREDEN.

From the 25th November, 1864, to the 25th May, 1867, I had the opportunity of observing the development of two new forms of
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Fungi (of the genus *Aspergillus*) upon the tympanic membrane of ten persons, four of whom were attacked on both sides. Having been able several times to watch and study the development of these parasites from their first appearance to their final extinction, I can assert that this parasitic vegetation existed independently of any other disease, and constituted a peculiar and very obstinate affection of the ear, accompanied with great derangement of functions and much suffering.

The two species of auricular fungi found by me presented all the principal botanical characters of *Aspergillus glaucus* (Link), but differed therefrom in the coloration of their organs of fructification, which leads me to name one of them *A. flavescens* and the other *A. nigricans*.

We may ascertain, not only with the microscope, but even with the naked eye, the existence of a parasitic pseudomembrane in the ear, and decide beforehand whether it is produced by a vegetation of *A. flavescens* or of *A. nigricans*. In both cases the parasitic membrane, when extracted entire, bears the very recognizable impression of the tympanic membrane, and consists of an interlaced, lardaceous, white and shining tissue, easily torn and dispersed, covered in several parts with brownish-yellow (*A. flavescens*) or perfectly black (*A. nigricans*) spots (spores). These agglomerations of spores often form upon the white surface applied to the tympanic membrane an annular black space of 1–2 millims. in breadth, corresponding to the periphery of the tympanum. In general the arrangement of the layers in each parasitic pseudomembrane proves that the parasite grows from without inwards; that is to say, it tends to bury itself in the tissue of the tympanic membrane.

A. nigricans, of which the organs of fructification have exactly the same black colour as those of *A. nigrescens*, discovered by C. Robin, on the 19th February 1848, in the aëriferous sacs of a pheasant, must not be confounded with that species, because the receptacular filaments of *A. nigrescens* are formed by long cells articulated end to end, and presenting at their point of contact a distinct constriction: moreover the circlet of basal cells round the capitula is not complete as in *A. nigricans*.

A. flavescens closely approaches the fungus of the lungs, discovered by Virchow, and described by Fresenius from specimens received from Virchow as a distinct species, which he names *A. fumigatus*, and identifies with the fungus found by him in the bronchi of an *Otis tarda* in the Frankfort Zoological Garden. But the descriptions and drawings of Fresenius and Virchow, and especially the microscopic preparation which had been sent to Fresenius and declared by him to be *A. fumigatus*, shown to me by Professor Schenk at Würzburg, make me perfectly sure that my *A. flavescens* is clearly distinguished from *A. fumigatus*, which, moreover, has greenish-brown spores.

To ascertain positively whether *A. flavescens* and *nigricans* are really new species of *Aspergillus*, or whether they only represent new

varieties, produced by the difference of the medium in which they grow, I undertook a series of experiments in cultivating my auricular fungi in different media. The lemon and the sweet orange proved to be especially favourable for these experiments. The result of these experiments, which were frequently repeated and modified, was very distinct and constant. Every time that I transplanted *A. flavescens* or *nigricans* from their animal soil to a vegetable one (a slice of lemon or orange), they infallibly returned to the same form of vegetable mould, namely *A. glaucus* (Link). Every distinctive character between *A. flavescens* and *A. nigricans* disappeared in consequence of their transmutation into *A. glaucus*, of which they are consequently only varieties, caused by the difference of the medium (animal or vegetable) in which they grow. When a slice of lemon or orange is sown with *A. flavescens* or *A. nigricans* in 48 hours the surface of the slice is already covered with a layer of sterile filaments of mycelium, which are fine and white and like those of a spider's web. In three days this white layer of mycelium is covered with an innumerable quantity of spores. We may then detect, by means of the microscope, the presence of specimens of an *Aspergillus* the sporanges and free spores of which are distinctly of a brownish-green colour (*A. glaucus*, Link).

(After some remarks on the treatment of these fungi when growing in the human ear, from which it appears that the best agents for their destruction are hypochlorite of lime and arsenite of potash even in very dilute solutions, the author proceeds as follows:—)

The *Aspergillus* when vegetating in the ear of the human subject produces a very characteristic disease, which I have named *Mycomyringitis* or *Myringomycosis aspergillina*. It presents two forms, according as it is occasioned by *A. flavescens* or *A. nigricans*. The latter produces more serious morbid phenomena than the former. I should state that hitherto I have never seen *A. flavescens* and *A. nigricans* vegetating simultaneously in the same ear, nor could I discover the least trace of a mixture of *Penicillium glaucum* (Link) with the *Aspergillus*, although this mixture occurs ordinarily in the moulds which cover vegetable substances. Having learnt that Troeltsch of Würzburg had recently found in the auditory meatus of a patient a mould formed by an *Aspergillus penicellatus*, I went to the spot to examine the microscopic preparations of the parasite, and found that they only presented a mixture of *Ascophora elegans* and *A. mucedo*.

I have had an opportunity of ascertaining as a matter of fact how injurious the moulds growing in rooms are to man. In a case studied by me, I was astonished at the unusual obstinacy with which the vegetations of *A. nigricans* were renewed for three months in the patient, notwithstanding the employment of the best parasiticides. Being unable to explain this extraordinary circumstance except by continual infection, I went to the hospital where the woman was a superintendent. I found that in three rooms, in which thirty-four

old women remained day and night, all the ceilings and windows, which were white-washed, were entirely covered with a green mouldy coat of *Penicillium glaucum*, whilst all the walls, which were painted in oil, were completely lined with a black and white mould, which presented the same *A. nigricans* as the patient's ear, only under the form of *Achorion* (according to Hallier). But a single cultivation in glycerine or on lemon sufficed to change it into a plant with well-developed sporanges. Washing the walls and ceilings with a solution of hypochlorite of lime, which was also employed in the ear, and the establishment of good ventilation, speedily put an end to the sufferings of the patient, upon whom all my therapeutical resources had previously failed.—*Comptes Rendus*, August 26, 1867, pp. 368–371.

The Theory of the Skeleton.

To the Editors of the Annals and Magazine of Natural History.

GENTLEMEN,—Absence from town has prevented me from seeing the 'Annals of Natural History' since July.

I have but a few words to say in reply to Mr. Seeley's letter in your August Number.

Any one who chooses to be at the trouble of reading the two pages in the 'Medico-Chirurgical Review,' from which Mr. Seeley extracts seven lines, will find as definite an outline of the theory of mechanical genesis of vertebræ as could be put in the short space available.

If he is at the further trouble of referring to the 'Principles of Biology,' §§ 254–258, he will find what Mr. Seeley chooses to call "vague hypothesis." Where Mr. Seeley "did not notice that these 'incident forces' (producing vertebral structure) were defined," he will see specified and illustrated by diagrams the particular incident forces which produce differentiation of the vertebrate axis from surrounding tissues, the particular incident forces which cause segmentation of it, and the particular incident forces which cause ossification to commence at the places where it does commence.

If, once more, he turns to § 301 (which I suppose Mr. Seeley overlooked), he will find definitely specified the particular physiological actions through which pressures and tensions cause the formation of bone.

Here, so far as I am concerned, the controversy must end.

I remain, Gentlemen,

Yours, &c.,

HERBERT SPENCER.